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EXAMINER

GUERRERO, MARIA F

ART UNIT PAPER NUMBER

2822

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/054,697

Applicant(s)

WALITZKI ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 15-17 and 20-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to the Election filed December 2, 2002.

Claims 1-23 are pending.

Election/Restrictions

2. Applicant's election of Species I in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 15-17, 20-22, 23 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 6.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claim 7 is objected to because of the following informalities: claim 7 recites "andor" in line 2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11-14 recite the limitation "the polishing process" in line 1. There is insufficient antecedent basis for this limitation in the claim. Two different polishing processes are recited in the claim. Therefore, It would be unclear where it is uncertain which of the two polishing processes was intended. MPEP § 2173.05(e).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub et al. (U.S. 6,328,796) in view of Chan et al. (U.S. 6,057,212).

Kub et al. teaches providing an initial multycrystalline substrate, polishing the multycrystalline substrate to reduce surface roughness to less than 10 nm (Abstract, col. 1, lines 1-25, col. 9, lines 5-15). Kub et al. shows forming a filler layer overlying the

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face of the substrate, polishing the surface of the filler layer to form a substantially smooth upper surface on the substrate (col. 9, lines 25-45). Kub et al. teaches the multycrystalline substrate being a ceramic handle substrate (col. 8, lines 35-68, col. 10, lines 15-30).

Kub et al. does not specifically show the surface roughness being 20 Angstroms or less, surface roughness being 5 Angstroms or less. However, Chan et al. shows polishing the surface in order to obtain a surface roughness of 5 Angstroms or less (col. 3, lines 55-65, col. 5, lines 10-15).

Since Kub et al. and Chan et al. are both from the same field of endeavor of preparing surface for bonding, the purpose disclosed by Chan et al. would have been recognized in the pertinent art of Kub et al.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kub et al. by specifying the surface roughness as taught Chan et al. in order to enhanced bonding properties.

7. Claims 1, 7-8, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enquist (U.S. 6,500,694) in view of Kub et al. (U.S. 6,328,796).

Enquist teaches polishing a substrate to obtain a smooth and planar surface, forming a filler layer overlying the face of the substrate, polishing the surface of the filler layer (SiO₂) to form a substantially smooth upper surface on the substrate, the surface roughness being between 5-10 Angstroms (col. 6, lines 35-55, col. 7, lines 10-35).

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Enquist does not specifically show the initial substrate being a multycrystalline substrate. However, Kub et al. shows employing the multycrystalline substrate (Abstract, col. 1, lines 20).

Since Enquist and Kub et al. are both from the same field of endeavor of preparing surface for bonding, the purpose disclosed by Kub et al. would have been recognized in the pertinent art of Enquist.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Enquist's process by using a multycrystalline substrate as taught Kub et al. in order to reduce cost.

8. Claims 4, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Enquist (U.S. 6,500,694) and Kub et al. (U.S. 6,328,796) as applied to claims 1, 7-8, 10 above, and further in view of Easter et al. (H1137).

Regarding claims 4, 6, and 9, the combination of Enquist and Kub et al. does not specifically show the film being polycrystalline silicon formed by low pressure CVD. However, Easter et al. using a polycrystalline silicon formed by low pressure CVD (col. 3, lines 20-33).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to specify the use polycrystalline silicon in the combination of Enquist and Kub et al. because Enquist suggested that silicon might also be used (col. 8, lines 10-15).

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9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krishna et al. (U.S. 5,571,373) in view of Chan et al. (U.S. 6,057,212).

Krishna et al. teaches applying a rough polishing step using alkaline slurry, changing the composition of the slurry by feeding neutral polishing slurry to the polishing pad and reducing the supply of the rough polishing slurry (Abstract, col. 5, lines 1-45).

Krishna et al. does not specifically show the surface roughness being 0.5nm or less. However, Chan et al. shows polishing the surface in order to obtain a surface roughness of 0.5 nm or less (col. 3, lines 55-65, col. 5, lines 10-15).

Since Krishna et al. and Chan et al. are both from the same field of endeavor of preparing surface for bonding, the purpose disclosed by Chan et al. would have been recognized in the pertinent art of Krishna et al.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Krishna et al. by specifying the surface roughness as taught Chan et al. in order to better reduce the surface roughness.

10. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krishna et al. (U.S. 5,571,373) and Chan et al. (U.S. 6,057,212 as applied to claim 18 above, and further in view of Fukami et al. (U.S. 5,821,167).

Regarding claim 19, the combination of Krishna et al. and Kub et al. does not specifically show applying a double-sided polishing. However, Fukami et al. teaches

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double-sided polishing a semiconductor wafer as part of the conventional process of preparing the substrate surface (Fig. 1, col. 5, lines 38-60, col. 6, lines 28-35).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Krishna et al. and Kub et al. by including the double-sided polishing as taught Fukami et al. because is part of the conventional polishing process.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hunt et al. (U.S. 6,428,387) and Wang (U.S. 6,046,112) teach adding TMAH to the slurry. J. A. Weima et al. "Nano-Polishing and subsequent optical characterization of CVD polycrystalline diamond films" teaches polishing polycrystalline films. Erin C. Jones et al. "Bonding of thin films on 200mm silicon wafers using chemical mechanical polishing" teaches the surface roughness being 0.38 nm". Bohr et al. (U.S. 5,911,111) teaches polishing a polysilicon layer.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Maria Guerrero
Maria Guerrero
Patent Examiner
February 20, 2003